AGS Job List Related to PP Run

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Injector Meeting

Revised April 28, 2008

April 21 2008

AGS pp Operation in Run8

- The best polarization level of this run was 60% with $1.5*10^{11}$. Lower than 65% reached in run6.
- Polarization at injection was about 4-5% (relatively) lower than run6.
- Emittances measured by AGS IPM near injection are twice as measured in run6, while emittances measured by BtA multi-wires are about the same as in run6. In addition, the emittances at AGS extractions were only slightly larger.
- Different polarization were measured with different horizontal tune path.

10+ Questions We Are Seeking Answers

1. What are the emittances at the AGS injection?
2. How serious is the emittance growth in the AGS?
3. Can we setup AGS injection with the model prediction?
4. What is the scheme of emittance growth near AGS injection, if it is there?
5. Why the IPM measured larger injection emittances this run while BtA and AGS late are about the same?
6. What is the intensity effect on emittance (both measurement and simulation)?
7. What need to be done for the spin simulation so that we can postdict all polarization losses we have seen so far? Is there any depolarization mechanism we have not accounted for?
8. Why did the different horizontal tune path result in very different polarization at the flattop?
9. Can simulation show that horizontal tune jump helps?
10. Can the polarization intensity dependence be fully explained by emittance (no instrumental effect)?

Emittances in BtA

- It is believed that one can't match dispersion between Booster and AGS. Before attacking the problem, we have to prove that it is a problem for pp (namely, it affects intensity, emittance, polarization).
- Nick believes that he does have a solution which matched both.
- Mike Blaskiewicz did beam steering study in 1994 and confirmed that the optical model of BtA is good. We probably have steering data in recent years which can be checked. (Leif, Woody, …..)
- Currently, the BtA multi-wire profiles do not provide a consistent optical model for the BtA. (Nick)
- Leif analyzed the BtA profile data as function of intensity. It showed vertical emittance grown linearly with intensity. The optical model will be reanalyzed with these data.
- Measure/survey the distances between magnets may not be necessary, if nothing moved/changed since 1994. Power supply polarity check may be needed. (??)

BtA matching

- A15 Multi-wire study. Can we get optical match information out of the single-turn vs multi-turn profiles?
- Simulation of particles scattering on the multi-wires and comparison with the experimental data. The goal is to disentangle the measured larger beam sizes with multiple turns into two pieces: optical mismatch and multiple scattering. (Waldo, Woody,…..)
- Upgrade for the future: what electronics upgrade is needed to get beam profiles for each turn? (Michiko, Leif, ……)

Emittance Comparison

- The beam emittance (rf off at flattop) are different now from run6:

  2/19/08 H 16π, V 13 π with $1.3*10^{11}$ inj.-on-the-fly

  3/06/08 H 13π, V 17π with $1.4*10^{11}$ inj.-on-the-porch

  5/11/06 H 11.4π V 16 π with $1.6*10^{11}$

  5/12/06 H 10.4π V 15.2π with $1.36*10^{11}$

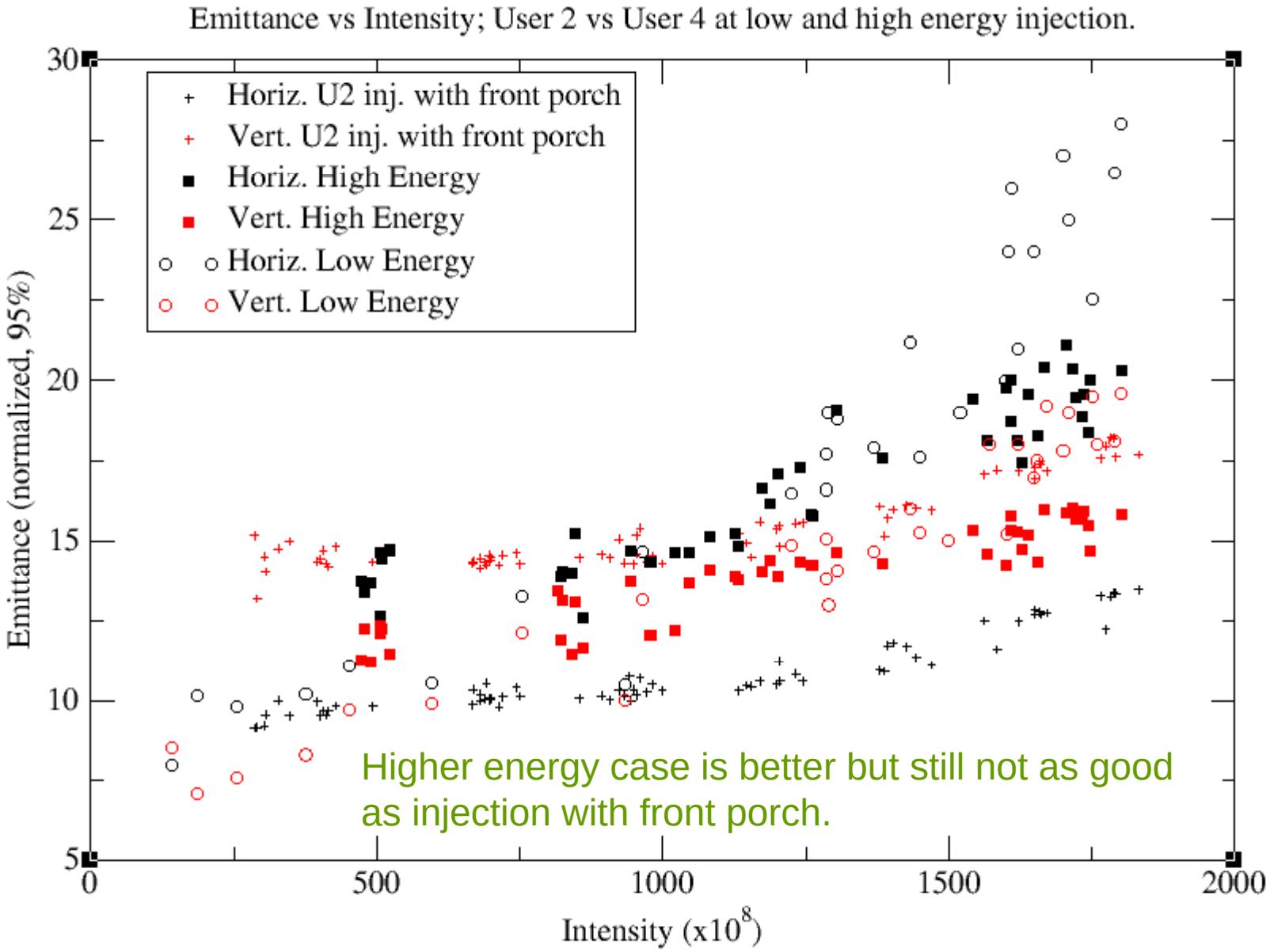
- Do we understand from model that why the apertures are different in the vertical and horizontal in the two cases?
- The Booster scraping is less effective this year. That is part of the reason that the emittances are larger this year. Why it is less effective?

AGS Modeling

- Continue ORM data analysis (Vincent, Kevin,……)
- Collecting the archived machine setups to model (Kevin).
- Online model (with both partial snakes) development (Kevin, …..)
- Understand the space charge effect on emittance with simulation. (Alfredo, Nick,…..)

IPM Emittances at AGS Extraction with RF off

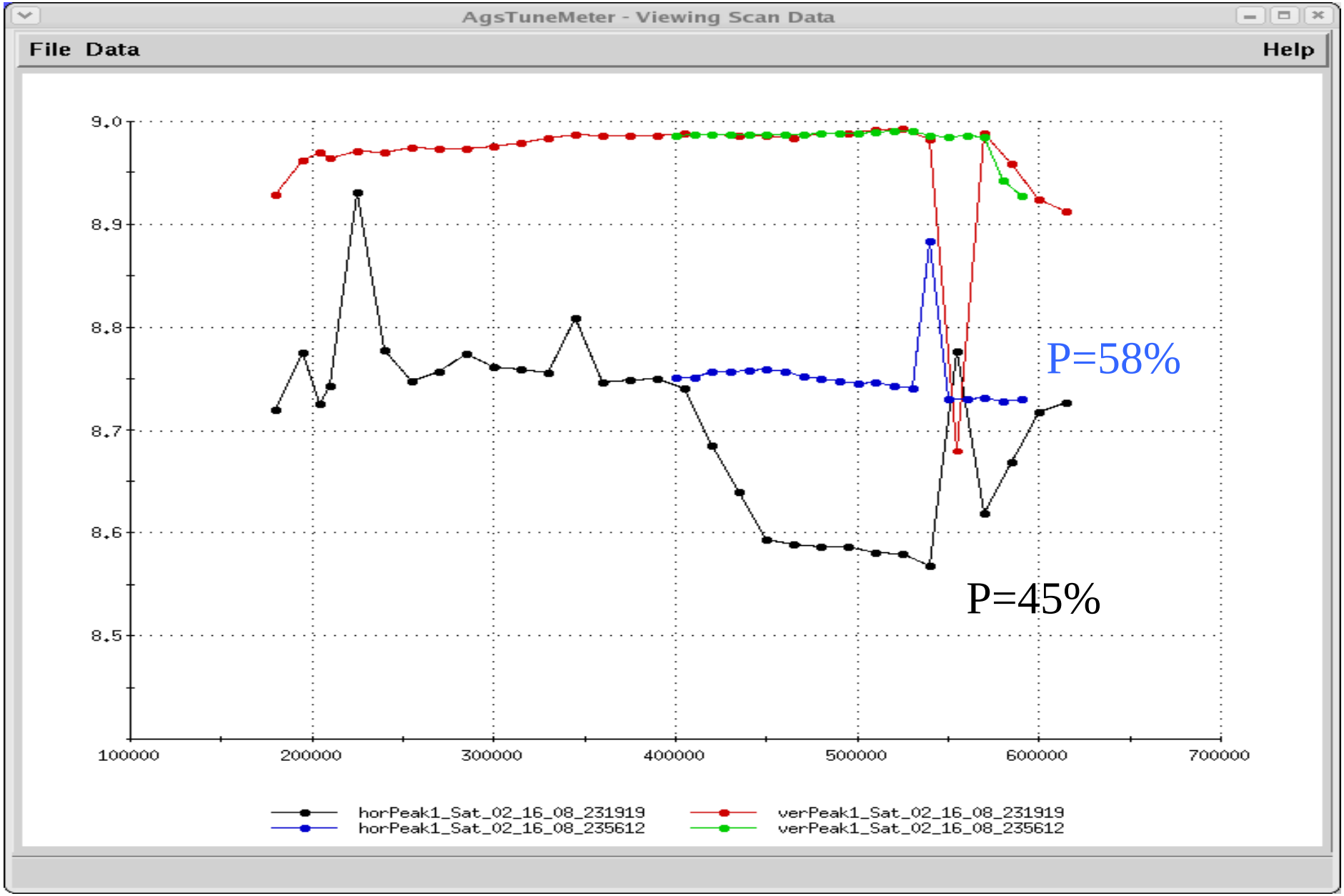
(Kevin Brown)



Polarization at Various Energies and Years

- With polarizations at various energies at different years, we can get some hints on which resonances were overcome better over years, and where the difficulty remains.
- We don't take that many lower energy polarization measurements anymore, but we do have ramp measurements, which can provide some guidance in this regards.
- Polarization stability. We do have many measurements with large variation out of statistical fluctuation while no machine condition changed. These runs should be studied from both machine and instrumentation aspects.
- Data mining by looking for any correlation of the polarization vs. emittance, orbits (horizontal and vertical), injection setup, extraction setup…….. (need help from operation group)
- Polarization measurements last run at $G\gamma$=7.5 last year. It was never fully understood of the polarization dependence on intensity there.

Polarization with Different ν_x Path



Horizontal Tune Jump

- It requires probably four old tune jump quads.
- Polarization evolution simulation with real AGS lattice. (Alfredo, Haixin….)
- Emittance growth issue? Based on past experience (1994), it may not be an issue.
- Searching for existing magnets, and power supplies. (Woody, Leif,…)
- We need to take some measurements with one real magnet (dimensions, inductance, coil configuration). (Joe, Woody, ….)
- Can we install two magnets in one straight section?
- Need 40 triggers based on energies. We may already have a intermediate solution. (Peggy+control group)
- Control application (control group)

Tune Jump for Horizontal Resonances

(Thomas)

- Add a single quad for this purpose.
- Minimum change of ν_x 0.01 change in 100 μs-> requires dB/dx of 0.5T/m and 300Gauss. This will double the crossing speed.
- Operation issue: has to be dead-reckoning of timing.
- Searching for existing P/S & magnet(s).
- Benefit on polarization transfer efficiency(16pi beam):

Crossing	P_f/P_i(peak)	P_f/P_i(whole)
regular speed	0.903	0.815
Double speed	0.950	0.903
4X speed	0.975	0.950